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COASTAL AGGLOMERATIONS AND THE TRANSFORMATION OF NATIONAL INNOVATION SPACES

A. S. Mikhaylov¹



In this article, I discuss the role of coastal agglomerations in the territorial heterogeneity of the world economy and the global innovation space. I pay particular attention to how proximity to the sea and ocean coasts influences the dynamics of innovation processes. I analyse coastalisation (the movement of economic activity and population to coastal zones) by considering the effects and inland diffusion of the exceptionally high innovative potential of coastal agglomerations. I put forward the hypothesis that coastal agglomerations are the most important transformational elements of a national innovation system. Further, I outline and systematise findings dealing with the specifics of innovative processes taking place in coastal agglomerations under the influence of the agglomerative and coastal factors. The result of this study is a comparison and assessment of the mutual influence of the two effects of spatial development that translate into the unique identity of coastal zone cities: urbanisation and coastalisation.

Keywords: innovation space, coastal agglomeration, innovation diffusion, innovation geography, urbanization, coastalisation

Introduction

Innovation activities are spread unevenly across the globe: a third of R&D and a fourth of all highly skilled jobs are located in just 10 % of NUTS 2 regions (*Bundesländer*, *voivodeships*). This disproportion persists at the local level: 58 % of patents are filed in 10 % of lower

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level regions with an innovative clustering and networking radius of up to 200 km.¹ This equally applies to Russia, almost no matter which statistical indicator is considered. The reason lies in the fact that the economic-geographical positions, the development of infrastructure, investment attractiveness, innovation potential, and other factors differ from region to region [1–4]. Space compression and concentration processes do not occur at similar rates either. For example, Tatyana Nefedova [5] cites the data suggesting that over 40 % of Russia's European municipalities are depressed and they are becoming increasingly peripheral in comparison to the cores.

Similar heterogeneity in development is observed in coastal agglomerations, which play an important role as regards foreign economic ties, transport, logistics, geopolitics, and innovation. A proof of the fact that coastal regions have favourable conditions for innovation is the range of successful forms of spatial networking: innovation clusters, science parks, R&D and technological innovation hubs, as well as others, most of them, however, do not relate to the maritime sector. These are Silicon Valley (US), Medicon Valley (Denmark–Sweden), the Bayan Lepas Free Industrial Zone (Malaysia), the Zhongguancun technology hub (China), the Guro Digital Industrial Complex (South Korea), and the Otaniemi Science Park (Finland). Coastalisation causes economic activities to gravitate towards the sea and human, financial, industrial, and infrastructural resources to concentrate in coastal regions. As to infrastructure, this concerns primarily transport and logistics, since 90 % of international trade is carried via sea ports. As a global phenomenon, coastalisation is drawing the attention of geoeconomic powers (the UK, China, the US, Japan, and others) to the sea factor.

Despite the growing role of coastal regions and cities as polarisation cores, there is a lack of comprehensive research into the innovative development of coastal agglomerations and their effect on the contiguous inland regions. The effect of the sea factor on regional innovative activities has been poorly investigated. Innovative processes at the level of cities are examined much less than those at higher levels of aggregation. However, the latter provide

¹ *OECD. Regions and Innovation: Collaborating across Borders, OECD Reviews of Regional Innovation, OECD Publishing, 2013. DOI: 10.1787/9789264205307-en*

less information for a detailed map of an innovation space. In this article, I will systematise an array of data obtained from studying innovative processes affected by the agglomerative and coastal factors. I will address the patterns of spatial innovative development as affected by urbanisation and coastalisation – two acknowledged factors that cause coastal agglomerations to grow.

Spatial heterogeneity in current economic conditions

The polarisation of geospace, which manifests itself in such terms as regional divergence, disproportion, asymmetry, spatial inequality, geographical inhomogeneity, interregional differentiation, territorial dispersion, and others associated with different levels of aggregation (between countries, regions, cities, and urban and rural areas) has been the focus of academic discussion since the 1950s. If using a broad interpretation, one can distinguish two groups of factors contributing to heterogeneous spatial development (fig. 1). The first group comprises natural factors that exist independently from human occupation (yet they are adapted to human needs) and characterise the environment. These are climate conditions, geographical position (including that in relation to other countries and regions), mineral deposits, terrain and elevation, waterways, soil quality, etc. Sergey Shanin [6] calls the natural resources potential the key measure used in typologies of Russian regions' heterogeneity. The second group comprises social factors, which can be divided into three groups.

Anthropogenic factors reflect the levels of human occupation and technological development. To measure these factors, researchers analyse the availability of utilities (electricity, water supply, central heating), access to social infrastructure (healthcare, education, and other institutions), the spread of ICT (Internet coverage and broadband quality), road density and quality, development of other thoroughfares ensuring the cohesion of a region and connecting it to the outer world, the availability of bridges, ports, railway stations, and airports, the proportion of urban population, etc.

Institutional factors relate to the development of society and social institutions, the quality of education and healthcare, crime and corruption rates, population mobility (including labour mobility), the proportion of banking and insurance services.



Intellectual factors are those related to human capital, business climate, innovation environment (industrial atmosphere), and inter-organisational cooperation, including that between business and academia. The methodological factors of the *anthropogenic* subgroup are evaluated based on whether they are present and, if so, to what extent, the *institutional* factors based on their quality and to what degree they meet the ideal, and the factors of the *intellectual* subgroup based on the primarily qualitative analysis of the elements of the regional ecosystem. The ecosystem is divided into competitive clusters, which express the identity of a territorial unit.

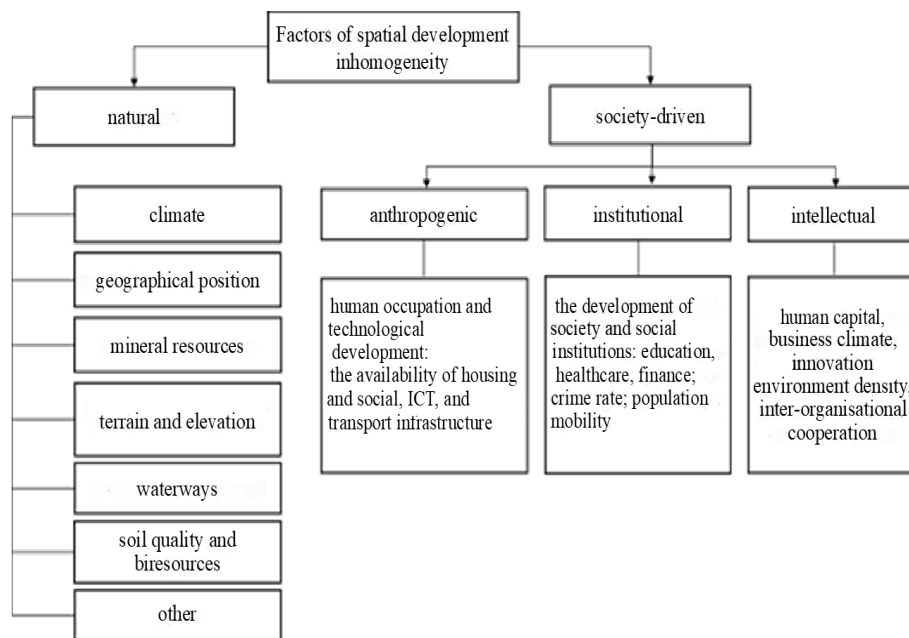


Fig. 1. Factors of heterogeneous spatial development

The above typology suggests that spatial inequality is dynamic and non-linear. The fundamental ideas about the determinants and patterns of this process are outlined in the works of Simon Kuznets [7]. He proposed an inverted U-shaped relation between income inequality and economic growth in industrialising countries, where income gap reaches its maximum at first and narrows later. This wave-like trajectory is a product of a limited pool of investment beneficiaries. However, the number of beneficiar-

ies grows as more people become employed in manufacturing. This often translates into the rapid development of areas with intensive economic activities: cities and urban agglomerations. In extrapolating the patterns of social inequality caused by economic development to geospace inequality, Jeffrey G. Williamson [8] was one of the first to verify the Kuznets curve hypothesis based on a study of development dynamics across twenty-four countries. His central idea was that, in countries generating wealth and income, unequal distribution of major natural resources of industrialisation² leads to growing regional disparities or regional divergence. At later stages, incomes have wider distribution, and this leads to inequality reduction or regional convergence. Recent studies into the socioeconomic heterogeneity of the Baltic region sates confirm the applicability of the U-curve, although with a skew towards large coastal cities [9].

Note that the disproportion in spatial development is considered inevitable (and even strategically beneficial in a national context [10]). However, if the ultimate goal is the removal of inequality in economic development, the proposed cyclicity seems to be merely notional (fig. 2). Circular dependence between social and economic factors means that low competitiveness of the economy complicates the recruitment of talents and precludes an increase in labour productivity. This reduces the competitiveness of the economy. This dependence translates into the depletion of local resources and their concentration in core areas. The subsequent redistribution of goods does not compensate for this disparity [11–12]. The reason lies in the limited geography of the diffusion of positive externalities and differences between old and new capital. The inflow of new investment, particularly, FDI, makes it possible for local companies to embrace new technology (partly, as a result of reverse engineering), to improve competencies, to create new value chains, to conduct more R&D, etc. Regions that draw and deplete resource will always outperform those experiencing the reverberations of this development [13; 14].

² Williamson sees the distribution of natural resources, in particular, the availability of coal and ore, the major cause of geospace inequality. Further factors affecting disparities are the national policy, capital mobility, labour migration, and interregional cohesion.

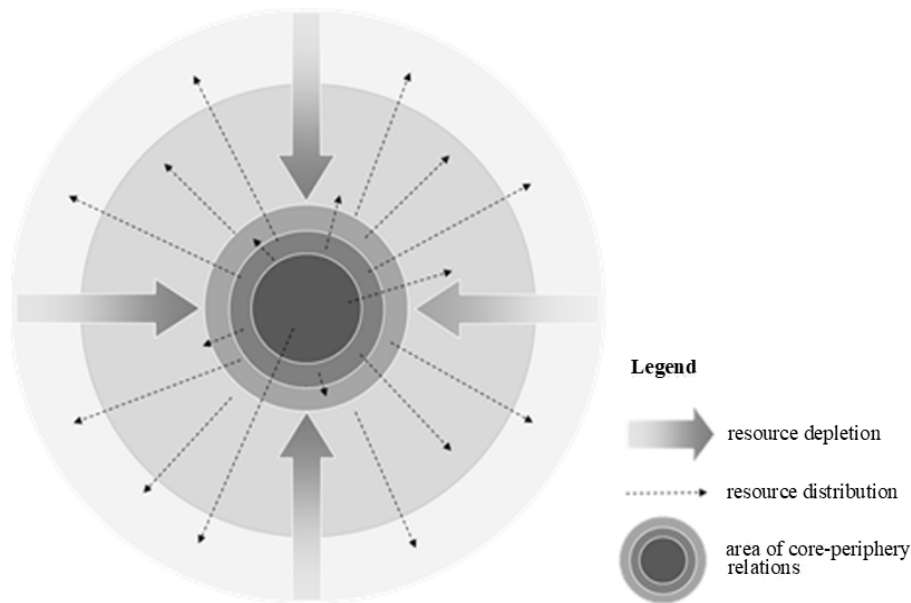


Fig. 2. Depletion and distribution effect in the context of core-periphery relations

With greater mobility of goods, capital, and people, sweeping globalisation created new urgency to the factor of location, which accounts for the competitive advantage of large agglomerations. Territories with a high concentration of economic activities ensure growth, which, in its turn, leads to an increase in the density of economic agents and further strengthening of economic activities [15; 16]. Location should be considered both as a competitive advantage, similarly to the technological and resource capacity, and as a source of heterogeneity. According to Neil Smith, equalising geographical advantages would result in perfect convergence [17]. Thus, the redistribution of resources has a complex configuration: unidirectional movement towards core regions does not take place. On the one hand, human, intellectual, and financial resources are depleted to concentrate in the cores of different levels. On the other hand, such concentration makes it possible to achieve a multiplier effect and to spur the development of satellite regions with insufficient economic potential and competitiveness. As a rule, such systems of relations are introduced on purpose and agreed on by all (or most) regions involved. A change in the de-

velopment trajectory means the core focusing on other regions and satellites adapting to the emergence of a new core. However, this process is complicated by deep-rooted socioeconomic and institutional ties. These may lead obstructions from trade unions and other institutions, from transport infrastructure and settlement system, from production processes within value-adding communities, and other factors.

The emergence of new centres of economic growth, which supplement and often replace old industrial centres, provides researchers with new evidence of the overriding importance of new economic growth factors: R&D capacity, human capital, cross-industry clusters and their effects, institutional conditions encouraging long-term high-risk investment, and hi-tech startups as the building blocks of the knowledge economy. The availability of coal, ore, peat, and other deposits becomes a factor inhibiting the innovative development of a territory. A vivid example is Germany's North-Rhine Westphalia. Catalysts of innovative activities are a developed social and academic infrastructure, a mild climate, a high-quality transport network, functional allied service industries, and other factors that contribute to the emergence of an innovative ecosystem and attract communities of innovators seeking to build high-tech small and medium businesses. Despite the focus being shifted from natural resources and fixed assets to human intellectual capital (together with spatial capital), a dramatic change is yet to come: spatial systems of economies in areas of long-term human occupation are very stable, as compared to the underdeveloped infrastructure of peripheries (see [18; 19]). A more likely option here is a transformation in the form of transition to an innovative economy.

Of interest is the development of coastal agglomerations, whose transformation manifests itself in a declining role of traditional maritime activities: shipbuilding, ship repair, fishing, and aquaculture. Marina *van Geenhuizen* and Piet *Rietveld* [20] emphasise that only a small proportion of port facilities have withstood global competition. Many of them have to find new niches in which the region has a competitive edge of significant growth potential. The changing role of the maritime component in the economies of coastal regions has not undermined the dominant position of these territories. This raises questions as to the source of their superiority.

Coastalisation and regional growth: coastal regions and spatial heterogeneity

Two-thirds of all cities of the world are located in the coastal zones of seas and oceans [21]. Population density in these cities is 2.5–3 times higher than that in their inland counterparts [22; 23]. Migration towards coastal regions is common to both developed and developing countries. For instance, population growth in Southern European cities has increased by 80 % over the past fifty years [24]. The suburban expansion of coastal cities has been registered in other parts of Europe [25–27]. Gravitation towards the sea has been observed throughout the history of humanity, and this process is not slowing down today. Coastal population is expected to account for three quarters of the population of the earth in the future [23; 28]. Occupying 12 % of the total dry land area, the coastal zone accounts for 45 % of the world economy [29].

Coastal regions, which are located in the frontier of international collaborations, act as contact zones in resource distribution. Centres of international trade, coastal regions support the logistics of commodity flows, accommodate financial centres, and have a developed tertiary sector, particularly, as regards banking and insurance services. At the same time, the development of the services sector is strongly correlated with that of port facilities [30]. Large ports have a positive effect on the national economy as a whole. Interregional flows from Hamburg reach Germany's southern regions, and those from Le Havre reach the Paris agglomeration. Ports, having a narrow specialisation, contribute primarily to the development of regional economies. Good examples are the port facilities of Rotterdam and Antwerp [31]. Greater openness of coastal regions translates into economic growth and reduces regional divergence [32]. An important factor here is intensive international cooperation, which comes to the fore when trade is liberalised and international industrial integration (including that at trans-basin level) enjoys institutional support.

In coastal zones, innovative development has the most pronounced effect on cities and agglomerations. Richard Florida identifies five US agglomerations that excel in innovations. Four of them are coastal: Boston, San Diego, San Francisco, and Seat-



tle [36]. The concentration of resources in coastal cities is accelerated by the obvious geographical limitations of coastal zones. However, the latter makes it possible to explore patterns in local economic and settlement systems. Encouraging high-tech companies to locate their businesses near ports is an internationally recognised strategy for creating port-city innovation systems. Examples include Montreal (Canada) and Rotterdam (the Netherlands) [37].

When studying the role played by ports in the diffusion of innovations, researchers usually focus on the functioning of maritime clusters as industrial complexes, agglomerations of inter-linked industries, and community-based networks [38], all of them unlocking the competitive potential of coastal zones. This approach can be instrumental in evaluating the resource function of a coastal territory only. It does not take into account the changing significance of coastal position. Still a driver of economic development, the sea is ceasing to be a mere source of marine bio-resources and turning into a beneficial factor for running a business and supporting a comfortable living. Case studies of the port city of Quebec show that most knowledge-based businesses operate in allied industries rather than in the maritime sector proper [39]. This means that activities relating to maritime transport and marine bio-resources cannot facilitate the innovative development of a coastal zone without the development of all the elements of the region's innovative system. However, the presence of a port means a higher concentration and more rapid circulation of resources, active migration, greater tolerance, and openness to novelties and changes. All these factors create a space of intensive transboundary and trans-basin inter-organisational contacts [40–42]. From this perspective, a peculiar feature of coastal innovative development is the cross-influence of several phenomena: coastalisation, multi-transboundariness, and urbanisation.

Conclusions

An objective feature of today's innovative space is its heterogeneity at the interregional and intraregional levels, where a special role is assigned to cities – major cores and attractors of



resources. Geoeconomic studies view the gravitation of people, ideas, and capital towards cities as a distinctive characteristic of the spatial development of today's world economy. Cities and agglomerations are major generators of national wealth. They provide a favourable environment for the development of infrastructure, commercial investment, industrialisation, employment, in-migration, logistics and commerce, education, consumer marketing, and culture. Moreover, they function as living labs for testing new economic, healthcare, educational, and environmental solutions. Effective management of urban environments, using self-improvement mechanisms and national policy tools, often provides a strong impetus to innovations and their diffusion.

Despite its peripheral status, coastal position facilitates the development of coastal cities and regions. Populated very early in human history, most coastal zones are areas of long-term human occupation. At the same time, new technological paradigms do not cause these areas to lag behind or decline. Flexible coastal economies are adapting to current market requirements. Close integration with global migration, financial, and commodity flows makes it possible to upgrade production processes and business services, to modernise fixed assets, and to recruit new talent. Over-concentration followed by clustering translates into lower costs (as regards purchasing and transporting raw materials), access to developed infrastructure and labour markets, more effective R&D supported by intra-industry or inter-organisational cooperation, joint internationalisation or internal market protection measures, and benefits derived from coopetition. Hubs for global value chains, coastal cities play an important role in national economies and innovations. Coastal regions outstrip their inland counterparts as regards the transition from low-value-added activities to independent innovative potential. To become integrated into international value-adding communities, these territories receive substantial FDI, welcome international companies, and accumulate competencies — all this being crucial for innovations.

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